

**DTRT57-09-R-SBIR1  
FY09.1**



**U. S. Department  
of Transportation**

Office of the Secretary  
of Transportation

## **PROGRAM SOLICITATION**

### **Small Business Innovation Research Program**

**Issue Date: February 13, 2009**

**Closing Date: April 15, 2009**

**DOT SBIR Program Office, RVA-21  
U.S. DOT/RITA/VNTSC  
55 Broadway  
Cambridge, MA 02142-1093**

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# DOT PROGRAM SOLICITATION FOR SMALL BUSINESS INNOVATION RESEARCH

## I. PROGRAM DESCRIPTION

### A. Introduction

This solicitation for research proposals is issued by The United States Department of Transportation (DOT) pursuant to the Small Business Innovation Development Act of 1982, P.L. 97-219 (codified at 15 U.S.C. 638) as amended by the Small Business Innovation Research (SBIR) Program, Extension, P.L. 99-443 which extended the program through September 30, 1993. On October 28, 1992, through the Small Business Innovation Research and Development Act of 1992 (P.L. 102-564), Congress reauthorized and extended the SBIR program for another seven years (2000). Subsequently, on December 21, 2000, through the Small Business Reauthorization Act of 2000 (P.L. 106-554) Congress again reauthorized the SBIR program.

The SBIR program encourages small business concerns to engage in research or research and development (R/R&D) that has the potential for commercialization to meet Federal research or research and development objectives.

The purposes of the SBIR program are:

- (1) To stimulate technological innovation;
- (2) To use small business to meet Federal R/R&D needs;
- (3) To increase private sector commercialization of innovations derived from Federal R/R&D; and
- (4) To foster and encourage participation by minority and disadvantaged persons in technological innovation.

In consonance with the statutory obligations of the Act, the DOT has established a Small Business Innovation Research Program —hereinafter referred to as the DOT SBIR Program.

The purpose of this solicitation is to invite small businesses with their valuable resources and creative capabilities to submit innovative research proposals that address high priority requirements of the DOT.

### B. Three-Phase Program

The DOT SBIR Program is a three-phase process.

#### **THIS SOLICITATION IS FOR PHASE I PROPOSALS ONLY.**

**Phase I.** Phase I provides support for the conduct of feasibility-related experimental or theoretical research or R/R&D efforts on research topics as described herein. The dollar value of the proposal may be up to \$100,000 unless otherwise noted and the period of performance is generally six months. The basis for award will be the scientific and technical merit of the proposal and its relevance to DOT requirements and priorities. **Only awardees in Phase I are eligible to participate in Phase II which is by invitation only.**

**Phase II.** Phase II is the principal R/R&D effort having a period of performance of approximately two years with a dollar value of up to \$750,000 unless otherwise noted. DOT will accept Phase II proposals under the DOT SBIR Program only from firms which have previously received a DOT Phase I award. Phase II proposals must be prepared in accordance with guidelines provided by DOT to Phase I awardees receiving an invitation to submit a Phase II proposal. Phase II awards will be based on the results of Phase I efforts, technical merit, agency priority and commercial applications, and the availability of appropriated funds to support the Phase II effort. Special consideration may be given to proposals that have obtained commitments for follow-on funding from non-Federal sources for Phase III.

**Phase III.** SBIR Phase III award logically follows SBIR Phase II and may be a continuation of the work under Phase II or commercialization of the research under the previous SBIR phases. Like SBIR Phase II, the award process is exempted from FAR subpart 5.2 requirements. Only those vendors who were awarded both a SBIR Phase I and Phase II may receive a SBIR Phase III award. There is no limit on the performance period length or dollar value of a SBIR Phase III, and the small business size limits for Phase I and Phase II awards do not apply to SBIR Phase III awards. Phase III is to be conducted by the small business with either:

- non-Federal funds to pursue commercial applications of R/R&D funded in Phases I and II, or

- non-SBIR Government funded contracts for continued research or products or processes intended for use by the United States Government.

### C. Eligibility

Each concern submitting a proposal must qualify as a small business at the time of award of Phase I and Phase II contracts. In addition, **the primary employment of the principal investigator must be with the small business firm at the time of contract award and during the conduct of the proposed research** unless otherwise approved by the Contracting Officer. Primary employment means that more than one-half of the principal investigator's time is spent with the small business. Also for both Phase I and Phase II, the R/R&D work must be performed in the United States. "United States" means the 50 states, the Territories and possessions of the United States, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, the Trust Territory of the Pacific Islands, and the District of Columbia.

All types of small business organizations may submit proposals, including high technology, R&D, manufacturing, and service firms. Companies with outstanding scientific or engineering competence in highly specialized product, process or service areas may wish to apply their expertise to the research topics in this solicitation through a laboratory prototype. Ideally, the research should make a significant contribution to the solution of an important transportation problem and provide the small business concern with the basis for new products, processes, or services.

### D. General Information

This is a solicitation for Phase I R/R&D proposals on advanced, innovative concepts from small business firms having strong capabilities in applied science or engineering.

The Phase I R/R&D proposals shall demonstrate a sound approach to the investigation of an important transportation-related scientific or engineering problem categorized under one of the topics listed in Section VIII.

A proposal may respond to any of the research topics listed in Section VIII, but must be limited to one topic. The same proposal may not be submitted under more than one topic. An organization may, however, submit separate proposals on different topics, or different proposals on the same topic, under this solicitation. Where similar research is discussed under more than one

topic, the offeror shall choose that topic which appears to be most relevant to the offeror's technical concept.

The proposed research must have relevance to the improvement of some aspect of the national transportation system or to the enhancement of the ability of an operating element of the DOT to perform its mission.

Proposals shall be confined principally to scientific or engineering research, which may be carried out through construction and evaluation. Proposals must be for R/R&D, particularly on advanced or innovative concepts, and shall not be for incremental or scaled-up versions of existing equipment or the development of technically proven ideas. Proposals for the development of already proven concepts toward commercialization, or which offer approaches already developed to an advanced prototype stage or for market research shall not be submitted. Commercialization is the objective of Phase III, in which private capital or non-SBIR funds are to be used to continue the innovative research supported by DOT under Phase I and Phase II.

The proposal shall be self-contained and checked carefully by the offeror to ensure that all preparation instructions have been followed.  
(See Proposal Checklist, Appendix D).

Requests for additional information or questions relating to the DOT SBIR Program may be addressed to:

Joseph Henebury  
DOT SBIR Program Director, RVA-21  
U.S. DOT/RITA/VNTSC  
55 Broadway  
Cambridge, MA 02142-1093

Telephone: (617) 494-2051  
Fax: (617) 494-2370  
Email Address: [Joseph.Henebury@dot.gov](mailto:Joseph.Henebury@dot.gov)  
Volpe Center Website: <http://www.volpe.dot.gov/sbir>

## II. DEFINITIONS

### A. Research or Research and Development (R/R&D)

R/R&D means any activity which is:

- (1) A systematic, intensive study directed toward greater knowledge or understanding of the subject studied;
- (2) A systematic study directed specifically toward applying new knowledge to meet a recognized need; or
- (3) A systematic application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

### B. Small Business Concern

A small business concern is one that at the time of award of Phase I and Phase II contracts meets all of the following criteria:

- (1) Is organized for profit, with a place of business located in the United States, which operates primarily within the United States or which makes a significant contribution to the United States economy through payment of taxes or use of American products, materials or labor;
- (2) Is in the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that where the form is a joint venture, there can be no more than 49 percent participation by business entities in the joint venture;
- (3) Is (i) at least 51 percent owned and controlled by one or more individuals who are citizens of the United States or permanent resident aliens in the United States, (ii) at least 51% owned and controlled by another business concern that is itself at least 51% owned and controlled by individuals who are citizens of, or permanent resident aliens in the United States; or (iii) a joint venture in which each entity to the venture must meet the requirements of either (i) or (ii) of this section;

- (4) Has, including its affiliates, not more than 500 employees.

### C. Socially and Economically Disadvantaged Small Business Concern

A socially and economically disadvantaged small business concern is one that is at least 51% owned and controlled by one or more socially and economically disadvantaged individuals, or an Indian tribe, including Alaska Native Corporations (ANCs), a Native Hawaiian Organization (NHO), or a Community Development Corporation (CDC). Control includes both strategic planning (as that exercised by boards of directors) and the day-to-day management and administration of business operations. See 13 CFR 124.109, 124.110, and 124.111 for special rules pertaining to concerns owned by Indian Tribes (including ANCs), NHOs, or CDCs, respectively.

### D. Women-Owned Small Business Concern

A woman-owned small business concern is one that is at least 51% owned and controlled by a woman or women. Control includes both the strategic planning (as that exercised by boards of directors) and the day-to-day management and administration of business operations.

### E. Veteran Owned Small Business

A veteran-owned small business concerns is one that is at least 51 percent owned and controlled by one or more veterans (as defined at 38 U.S.C. 101(2) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans, and the management and daily business operations of which are controlled by one or more veterans.

### F. Subcontract

Subcontract means any agreement, other than one involving an employer-employee relationship, entered into by a Federal Government funding agreement awardee calling

for supplies or services required solely for the performance of the original funding agreement.

**G. Historically Underutilized Business  
Zone (HUBZone)**

A HUBZone small business concern is one that meets the following criteria:

1. Located in “historically underutilized business zone” or HUBZone area located in one or more of the following:
  - a) A qualified census tract (as defined in Section 42(d)(5)(i)(I) of the Internal Revenue Code of 1986);
  - b) A qualified “non-metropolitan county” (as defined in Section 143(k)(2)(B) of the Internal Revenue Code of 1986) with a median household income of less than 80% of the state median household income or with an unemployment of not less than 140% of the statewide average based on U.S. Department of Labor recent data; or
  - c) Lands within the boundaries of Federally recognized Indian reservations.
2. Owned and controlled by one or more U.S. citizen(s).
3. At least 35% of its employees must reside in a HUBZone.

### III. PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS

#### A. Proposal Submission Requirements

- Each proposal shall not exceed 25 pages (regular size type – no smaller than 10 point font size – single or double spaced, standard 8 ½” by 11” pages) including proposal cover sheet, contract pricing proposal, and all enclosures or attachments.
- Proposals must be a PDF file and submitted online
- No duplicate proposals shall be sent by any other means.
- Proposals may only be submitted online, a link to the web form can found here:  
<http://www.volpe.dot.gov/sbir/current.html>  
Instructions are included on the submission page.
- Proposals must be received no later than 5:00 p.m. EST on April 15, 2009.
- The proposal file name shall contain eight (8) characters—the first three shall be the topic number you are proposing to (i.e., FH3), and the remaining five characters shall be a unique abbreviation of your company’s name.

It will be available to only the team of DOT engineers and/or scientists responsible for evaluating your proposal.

#### B. **Proposal Cover Sheet**

Complete the Proposal Cover Sheet in Appendix A as Page one of your proposal. All pages shall be numbered consecutively, beginning with the Proposal Cover Sheet.

#### C. **Project Summary**

Complete the form in Appendix B as Page two of your proposal. The Project Summary shall include a technical abstract with a brief statement of the problem or opportunity, project objectives, and description of the effort. Anticipated results and potential applications of the proposed research shall also be summarized in the space provided. The Project Summary of successful proposals may be published by the DOT and, therefore, shall not contain classified or proprietary information. The technical

abstract must be limited to 200 words in the space provided on the Project Summary form.

#### D. **Technical Content**

Submitted proposals must include the following:

- (1) **Identification and Significance of the Problem or Opportunity.** The specific technical problem or innovative research opportunity addressed and its potential benefit to the national transportation system shall be clearly stated.
- (2) **Phase I Technical Objectives.** State the specific objectives of the Phase I R/R&D effort, including the technical questions it will try to answer to determine the feasibility of the proposed approach.
- (3) **Phase I Work Plan.** Describe the Phase I R/R&D plan. The plan shall indicate what will be done, where it will be done, and how the R/R&D will be managed or directed and carried out. Phase I R/R&D shall address the objectives and the questions cited in (2) above. The methods planned to achieve each objective or task shall be discussed in detail, including the level of effort associated with each task.
- (4) **Related Research or R&D.** Describe significant R/R&D that is directly related to the proposal including any conducted by the project manager/principal investigator or by the proposing firm. Describe how it relates to the proposed effort, and any planned coordination with outside sources. The offeror must persuade reviewers of his or her awareness of key recent R/R&D conducted by others in the specific topic area.
- (5) **Key Personnel and Bibliography of Directly Related Work.** Identify key personnel involved in Phase I including their directly related education, experience, and bibliographic information. Where vitae are extensive, summaries that focus on the most relevant experience or publications are desired and may be necessary to meet proposal page limitations.

- (6) **Relationship with Future Research and Development.**
- (a) State the anticipated results of the proposed approach if the project is successful (Phase I and Phase II).
  - (b) Discuss the significance of the Phase I effort in providing a foundation for Phase II R/R&D effort.
- (7) **Facilities.** Provide a detailed description, availability and location of instrumentation and physical facilities proposed for Phase I.
- (8) **Consultants.** Involvement of consultants in the planning and research stages of the project is permitted. If such involvement is intended, it shall be described in detail.
- (9) **Potential Applications.** Briefly describe:
- (a) Whether and by what means the proposed project appears to have potential commercial application.
  - (b) Whether and by what means the proposed project appears to have potential use by the Federal Government.
- (10) **Similar Proposals or Awards.** Warning — while it is permissible, with proposal notification, to submit identical proposals or proposals containing a significant amount of essentially equivalent work for consideration under numerous Federal program solicitations, it is unlawful to enter into contracts or grants requiring essentially equivalent effort. If there is any question concerning this, it must be disclosed to the soliciting agency or agencies before award.
- If a firm elects to submit identical proposals or proposals containing a significant amount of essentially equivalent work under other Federal program solicitations, a statement must be included in each such proposal indicating:
- (a) The name and address of the agencies to which proposals were submitted or from which awards were received;
  - (b) Date of proposal submission or date of award;

- (c) Title, number, and date of SBIR Program solicitations under which proposals were submitted or awards received;
- (d) The applicable research topics for each SBIR proposal submitted or award received;
- (e) Titles of research projects; and
- (f) Name and title of Project Manager or Principal Investigator for each proposal submitted or award received.

#### **E. Contract Pricing Proposal**

A firm fixed price Phase I Contract Pricing Proposal (Schedule 1) must be submitted in detail as shown in Appendix C. Note: firm fixed price is the type of contract to be used for Phase I SBIR awards. Some cost breakdown items of Appendix C may not apply to the proposed project. If such is the case, there is no need to provide information for each and every item. It is important, however, to provide enough information to allow the DOT to understand how the offeror plans to use the requested funds if the contract is awarded. Phase I contract awards may include profit.

#### **F. Central Contracting Registration (CCR) and Data Universal Numbering System (DUNS) Identification Number**

Since October 1, 2003, it is federally mandated that any business wishing to do business with the Federal Government under a Federal Acquisition Regulation (FAR)-based contract must be registered in CCR before being awarded a contract. You can find more information on CCR and the registration process in their handbook, <http://www.ccr.gov/handbook.asp>. You can register online at <http://www.ccr.gov> by clicking on “Start New Registration” if you already have a DUNS number. If you need a DUNS number, you can find instructions at <http://fedgov.dnb.com/webform/displayHomePage.do>

A firm must note its DUNS identification number on Appendix C, Contract Pricing Proposal, Schedule 1. This number is assigned by Dun & Bradstreet, Inc.

#### **G. Prior SBIR Phase II Awards**

If the small business concern has received more than 15 Phase II awards in the prior five fiscal years, submit name of awarding agency, date of award, funding agreement number, amount, topic or subtopic title, follow-on agreement amount, source and date of



commitment, and current commercialization status for each Phase II. (This required proposal information shall not be counted toward the proposal 25-page count limitation.)

## IV. METHOD OF SELECTION AND EVALUATION CRITERIA

### A. General

All Phase I and Phase II proposals will be evaluated and judged on a competitive basis. Initially, all proposals will be screened to determine responsiveness to the solicitation. Proposals passing this screening will be evaluated to determine the most promising technical and scientific approaches. Each proposal will be judged on its own merit. The DOT is under no obligation to fund any proposal or any specific number of proposals on a given topic or subtopic. It may elect to fund several or none of the proposed approaches to the same topic or subtopic.

### B. Evaluation Criteria

The evaluation process involves the following factors:

- (1) Scientific and technical merit and the feasibility of the proposal's commercial potential, as evidenced by:
  - a) Past record of successful commercialization of SBIR or other research;
  - b) Existence of Phase III funding commitments from private sector or non-SBIR funding sources; and
  - c) Presence of other indicators of the commercial potential of the idea.
- (2) The adequacy of the work plan and approach to achieve specified work tasks and stated objectives of the proposed effort within budgetary constraints and on a timely schedule.
- (3) Qualifications of the proposed principal/key investigator(s) including demonstrated expertise in a disciplinary field related to the particular R/R&D topic that is proposed for investigation.
- (4) Adequacy of supporting staff and facilities, equipment, and data for the successful completion of the proposed R/R&D.

### C. Prescreening

Each proposal submission will be examined to determine if it is complete and contains adequate technical and pricing data. Proposals that do not meet the basic requirements of the solicitation will be excluded from further consideration. Each offeror will be notified promptly by email of such action.

### D. Schedule

All DOT reviews shall be completed and awards recommended within twelve weeks of the closing date for Phase I proposals.

### E. Program Selection

A Proposal Review Panel, chaired by the DOT SBIR Program Director and comprising senior management officials representing the Department's Operating Administrations and the Office of the Secretary, will arrange for review and evaluation of proposals by professionals, in their respective organizations, of all Phase I proposals that meet the requirements of this solicitation. The Proposal Review Panel will review the technical evaluations by the engineers and/or scientists and recommend to the DOT SBIR Program Director the proposals for awards. The DOT SBIR Program Director will announce the awards.

### F. Contact with DOT

Contact with DOT relative to this solicitation during the Phase I proposal preparation and evaluation period is restricted for reasons of competitive fairness. Technical questions pertaining to the FY09.1 DOT SBIR solicitation research topics must be submitted to the DOT SBIR Program Office by e-mail to: [Linda.Duck@dot.gov](mailto:Linda.Duck@dot.gov). Technical questions will be researched and answers provided in as timely a manner as possible. Technical questions submitted to the DOT SBIR Program Office during the few weeks prior to the closing date for receipt of Phase I proposals may not be able to be answered before the closing date.

No information on proposal status will be available until the complete list of FY09.1 Phase I Award Recommendations is posted on the DOT SBIR Program Webpage: <http://www.volpe.dot.gov/sbir>. For planning purposes the notification of FY09.1 Phase I Award Recommendations is expected to be posted on the DOT SBIR Program Webpage by June 5, 2009. **Phase I proposals which are not included in the June 5<sup>th</sup> list of FY09.1 Phase I Award Recommendations will not receive an award.**

**NO WRITTEN CORRESPONDENCE  
REGARDING PROPOSAL STATUS WILL BE  
ANSWERED.**

After the FY09.1Phase I Award Recommendations are posted on the DOT SBIR Program Webpage, a debriefing comprised of the overall comments on the proposal may be provided to the offeror upon request.

Debriefing requests should be submitted to the  
Contracting Officer by e-mail to:

[Darren.Shaffer@dot.gov](mailto:Darren.Shaffer@dot.gov), and must include the offeror's name, address, research topic number, and the proposal identification number assigned on the acknowledgement of receipt card. The identity of the evaluators will not be disclosed.

## V. CONSIDERATIONS

### A. Awards

It is estimated that during FY09.1, DOT will award approximately 8 Phase I contracts with an anticipated potential maximum of 10 awards, depending on actual funding available and the responses from small business firms to the solicited research topics in Section VIII.

All Phase I awards will be firm fixed price contracts and may be up to \$100,000 each unless otherwise noted. Phase II awards anticipate cost-plus-fixed-fee contracts with a value of up to \$750,000 each unless otherwise noted. Phase II awardees will be required to have an acceptable accounting system to receive a cost-plus-fixed-fee contract.

Only recipients of Phase I contracts will be eligible to compete for Phase II awards.

DOT's Operating Administrations contribute to SBIR funding. Each Operating Administration's contribution may be used only to support research of concern to that Operating Administration. For example, funds furnished by the Federal Highway Administration may not support research solely of concern to the National Highway Traffic Safety Administration. Based on anticipated funding levels, there may not be adequate funding within the DOT SBIR Program to support Phase I and/or Phase II awards for research which is solely of concern to the following Operating Administrations: Federal Aviation Administration, Federal Highway Administration, Federal Motor Carrier Safety Administration, Federal Railroad Administration, Federal Transit Administration, National Highway Traffic Safety Administration, Research and Innovative Technology Administration, and Pipeline Hazardous Materials Safety Administration. Phase I and Phase II awards for such research will depend on the actual funding available.

### B. Reports

Under Phase I SBIR contracts, three reports will be required, consisting of two interim letter reports, and a comprehensive final report.

### C. Payment Schedule

Payments for Phase I contracts will be made in three equal installments upon submission of invoices by the contractor in conjunction with the submission of acceptable reports as described in Paragraph B above.

### D. Innovations, Inventions, and Patents

1. **Proprietary Information.** Information contained in unsuccessful proposals will remain the property of the offeror. The Government may, however, retain copies of all proposals. Public release of information in any proposal submitted will be subject to existing statutory and regulatory requirements.

If proprietary information is provided by a offeror in a proposal which constitutes a trade secret, proprietary commercial or financial information, confidential personal information or data affecting national security, it will be treated in confidence, to the extent permitted by law, provided this information is clearly marked by the offeror with the term "confidential proprietary information" and provided the following legend appears on the title page of the proposal:

"For any purpose other than to evaluate the proposal, these data shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed in whole or in part, provided that if a contract is awarded to this offeror as a result of or in connection with the submission of these data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the contract. This restriction does not limit the Government's right to use information contained in the data if obtained from another source without restriction. The data subject to this restriction is contained pages \_\_\_\_\_ of this proposal."

Any other legend may be unacceptable to the Government and may constitute grounds for return of the proposal without further consideration and without assuming any liability for inadvertent disclosure. The Government will limit dissemination of such information to within official channels.

DOT prefers that offerors avoid inclusion of proprietary data in their proposals. If the inclusion of proprietary data is considered essential for meaningful evaluation of a proposal submission, then such data should be provided on a separate page with a numbering system to key it to the appropriate place in the proposal.

2. **Rights in Data Developed under SBIR Contracts.** Rights in technical data, including

software developed under any contract resulting from this solicitation, shall remain with the contractor except that the Government shall have the limited right to use such data for Government purposes and shall not release such data outside the Government without permission of the contractor for a period of four years from completion of the project from which the data were generated. However, effective at the conclusion of the four-year period, the Government shall retain a royalty-free license for Federal Government use of any technical data delivered under an SBIR contract whether patented or not.

3. **Copyrights.** With prior written permission of the Contracting Officer, the contractor normally may copyright and publish (consistent with appropriate national security considerations, if any) material developed with DOT support. The DOT receives a royalty-free license for the Federal Government and requires that each publication contain an appropriate acknowledgement and disclaimer statement.
4. **Patents.** Small business firms normally may retain the principal worldwide patent rights to any invention developed with Government support. The Government receives a royalty-free license for Federal Government use, reserves the right to require the patent holder to license others in certain circumstances, and requires that anyone exclusively licensed to sell the invention in the United States must normally manufacture it domestically. To the extent authorized by 35 U.S.C. 205, the Government will not make public any information disclosing a Government-supported invention for a two-year period to allow the contractor a reasonable time to pursue a patent.

#### **E. Cost-Sharing**

Cost-sharing is permitted for Phase II proposals under the topic areas identified in this solicitation; however, cost-sharing is not required nor will it be a factor in proposal evaluations.

#### **F. Profit or Fee**

A profit is allowed on awards to small business concerns under the DOT SBIR Program.

#### **G. Joint Ventures or Limited Partnerships**

Joint ventures and limited partnerships are permitted provided the entity created qualifies as a small business concern in accordance with the Small Business Act, 15 U.S.C. 631, and the definition included in this solicitation.

#### **H. Research and Analytical Work**

1. **For Phase I, a minimum of two-thirds of the research and/or analytical effort must be performed by the proposing firm** unless otherwise approved in writing by the Contracting Officer.
2. **For Phase II, a minimum of one-half of the research and/or analytical effort must be performed by the proposing firm** unless otherwise approved in writing by the Contracting Officer.

#### **I. Contractor Commitments**

Upon award of a contract, the awardee will be required to make certain legal commitments through acceptance of numerous contract clauses. The outline that follows is illustrative of the types of clauses to which the contractor would be committed. This list shall not be understood to represent a complete list of clauses to be included in Phase I contracts, nor to be the specific wording of such clauses. A complete copy of the terms and conditions will be provided upon issuance of the model contract for signature prior to award.

1. **Standards of Work.** Work performed under the contract must conform to high professional standards.
2. **Inspection.** Work performed under the contract is subject to Government inspection and evaluation at all times.
3. **Examination of Records.** The Comptroller General (or a duly authorized representative) shall have the right to examine any directly pertinent records of the contractor involving transactions related to this contract.
4. **Default.** The Government may terminate the contract if the contractor fails to perform the work contracted.
5. **Termination for Convenience.** The contract may be terminated at any time by the Government if it deems termination to be in its best interest, in which case the contractor will be

- compensated for work performed and for reasonable termination costs.
6. **Disputes.** Any dispute concerning the contract which cannot be resolved by agreement shall be decided by the Contracting Officer with right of appeal.
  7. **Contract Work Hours.** The contractor may not require an employee to work more than eight hours a day or 40 hours a week unless the employee is compensated accordingly (i.e., overtime pay).
  8. **Equal Opportunity.** The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin.
  9. **Affirmative Action for Veterans.** The contractor will not discriminate against any employee or applicant for employment because he or she is a disabled veteran or veteran of the Vietnam era.
  10. **Affirmative Action for Handicapped.** The contractor will not discriminate against any employee or applicant for employment because he or she is physically or mentally handicapped.
  11. **Officials Not to Benefit.** No member of or delegate to Congress shall benefit from the contract.
  12. **Covenant Against Contingent Fees.** No person or agency has been employed to solicit or secure the contract upon an understanding for compensation except bonafide employees or commercial agencies maintained by the contractor for the purpose of securing business.
  13. **Gratuities.** The contract may be terminated by the Government if any gratuities have been offered to any representative of the Government to secure the contract.
  14. **Patent Infringement.** The contractor shall report each notice or claim of patent infringement based on the performance of the contract.
  15. **Procurement Integrity.** Submission of a proposal under this solicitation subjects the offeror to the procurement integrity provision (§27) of the Office of Federal Procurement Policy Act (41 U.S.C. 423). This statute, as implemented by Federal Acquisition Regulation (FAR, 48 CFR) §3.104, prescribes the following conduct by competing contractors during an agency procurement: offering or discussing future employment or business opportunities with an agency procurement official; promising or offering a gratuity to an agency procurement official; and/or soliciting or obtaining proprietary or source selection information regarding the procurement. Violations of the statute may result in criminal and/or civil penalties, disqualification of a offeror, cancellation of the procurement, or other appropriate remedy.
16. **Section 508 Access Board Standards.**  
All electronic and information technology deliverables rendered must comply with Section 508 of the Rehabilitation Act and the Access Board Standards available for viewing at <http://www.section508.gov>. Unless otherwise indicated, the contractor represents by signature on a contract that all deliverables will comply with the Access Board Standards.
- J. Additional Information**
1. This solicitation is intended for informational purposes and reflects current planning. If there is any inconsistency between the information contained herein and the terms of any resulting SBIR contract, the terms of the contract are controlling.
  2. Before award of an SBIR contract, the offeror shall complete Online Representations and Certifications Application: <https://orca.bpn.gov>
  3. The Government may request the offeror to submit additional management, personnel, and financial information to assure responsibility of the offeror.
  4. The Government is not responsible for any monies expended by the offeror before award of any contract.
  5. This solicitation is not an offer by the Government and does not obligate the Government to make any specific number of awards. Also, awards under this program are contingent upon the availability of funds.
  6. The DOT SBIR Program is not a substitute for existing unsolicited proposal mechanisms. Unsolicited proposals shall not be accepted under the DOT SBIR Program in either Phase I or Phase II. See

<http://www.volpe.dot.gov/procure/unsolguide.html>  
for specifics on unsolicited proposal submission requirements.

7. If an award is made pursuant to a proposal submitted under this solicitation, the contractor will be required to certify that he or she has not previously been, nor is currently being paid for essentially equivalent work by any agency of the Federal Government.
8. When purchasing equipment or a product with funds provided under the DOT SBIR Program, purchase only American made equipment and

products, to the extent possible in keeping with the overall purposes of the program.

9. In accordance with FAR 52.233-2, Service of Protest, the following Service of Protest procedures shall be followed. Protests, as defined in Section 33.101 of the FAR that are filed directly with an agency, and copies of any protests that are filed with the Government Accountability Office (GAO), shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgement of receipt from: Orin Cook, DOT/RITA/Volpe Center, 55 Broadway, RVP-31, Cambridge, MA 02142-1093

## **VI. SCIENTIFIC AND TECHNICAL INFORMATION SOURCES**

The following organizations may be sources for providing technology search and/or document services and may be contacted directly for service and cost information:

Center for Technology Commercialization  
1400 Computer Drive  
Westborough, MA 01581  
(508) 870-0042

Federal Information Exchange, Inc.  
555 Quince Orchard Road, Suite 360  
Gaithersburg, MD 20878  
(301) 975-0103

Midcontinent Technology Transfer Center  
Texas Engineering Extension Service  
The Texas A&M University System  
301 Tarrow Street, Suite 119  
College Station, TX 77840-7896  
(409) 845-8762

MidAtlantic Technology Applications Center  
University of Pittsburgh  
3400 Forbes Avenue, 5<sup>th</sup> Floor  
Pittsburgh, PA 15260  
(412) 383-2500

Great Lakes Industrial Technology Center  
25000 Great Northern Corporation Center, Suite 260  
Cleveland, OH 44070-5320  
(440) 734-0094

Southern Technology Applications Center  
University of Florida  
1900 SW 34<sup>th</sup> Street, Suite 206  
Gainesville, FL 32608  
(352) 294-7822

National Technical Information Service  
5285 Port Royal Road  
Springfield, VA 22161  
(800) 553-6847

Technology Transfer Center  
University of Southern California  
3716 South Hope Street, Suite 200  
Los Angeles, CA 90007-4344  
(213) 743-2352



## VII. RESEARCH TOPICS

Phase I research topics for DOT Operating Administrations are listed below. These topics indicate the specific areas for which proposals are to be considered for acceptance by DOT. The topics are not listed in any order of priority. Each proposal must respond to one (and only one) topic as described in this section. A proposal may, however, indicate and describe its relevance to other topics.

**POTENTIAL MAXIMUM  
FY09.1**

<b>DOT OPERATING ADMINISTRATION/TOPIC</b>	<b>PHASE I AWARDS</b>
<b>FEDERAL HIGHWAY ADMINISTRATION</b>	<b>5 AWARDS</b>
091-FH1 Deployment-Ready Technologies Mitigating Shockwave Development On Roadway Systems	
091-FH2 Development of a Thermographic Device for Evaluating Integrity of Steel Bridge Coatings Nondestructively	
091-FH3 Vehicle Detection, Counting and Tracking System for Travel Surveys, Traffic Safety Systems, and Traffic Control Systems	
091-FH4 Pedestrian Detection, Counting and Tracking Systems for Travel Surveys, Traffic Safety Systems and Traffic Control Systems	
091-FH5 Self-Sustaining, Intelligent Pavement Systems	
<b>FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION</b>	<b>1 AWARD</b>
091-FM1 Individualized Fatigue Risk Management in Trucking Operations	
<b>PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION</b>	<b>2 AWARDS</b>
091-PH1 Pipeline Safety:	
1. Development of in-field pipeline inspection tools	
091-PH2 Hazardous Materials:	
1. In-service Testing of Composite Cylinders	
2. Nanotechnology Application in Hazmat Transportation	

## **Federal Highway Administration (FHWA)**

### **09-FH1 Deployment-Ready Technologies Mitigating Shockwave Development On Roadway Systems**

#### **Problem Statement:**

Congested roadway systems frequently experience undesirable traffic phenomena and flow characteristics. These phenomena include the development and propagation of shockwaves on both interrupted flow facilities (surface streets) and uninterrupted flow facilities (freeways). These shockwaves (and similar phenomena such as standing queues) reduce the efficiency and productivity of the roadway network, endanger the safety of the road users, and result in wasted fuel and associated negative environmental impacts. One example of such a situation is a driver needlessly accelerating and then performing a rapid deceleration in advance of unseen queued vehicles waiting at a signalized intersection rather than more deliberately and efficiently approaching the intersection by coasting and safely decelerating to a stop.

Intelligent Transportation Systems (ITS) technologies, including vehicle-to-vehicle (V2V) and infrastructure-to-vehicle (I2V) technologies, have demonstrated potential for the mitigation of shockwaves on roadway systems. Current mobile communication technologies, traffic management technologies, and vehicle warning/control technologies could potentially be arrayed to address aspects of this problem. A desired outcome of this activity would be to conceptualize the combining of near-term deployable technologies to address one or more aspects of this problem, and then to demonstrate a product or collection of products based on this concept.

#### **Area of Research**

The area of research that may be considered in this effort is intentionally broad to encourage a wide range of potential innovations. However, the focus is on near-term technologies that can be readily connected and deployed to address this problem. This effort is not a call for basic research; nor is the effort for the development of entirely new technologies that will require extensive resources to plan and implement. The innovations may enhance or combine current approaches such as variable speed limits, roadside warning systems, or other current technologies addressing the problem. In-vehicle warning systems and/or vehicle control technologies may also be incorporated into a proposed innovation.

Proposers may consider applications for specific junctions or roadway geometries (e.g., at-grade rail intersections, signalized intersections, merge/weave areas) or propose more general applications. Innovations may address specific road user or vehicle types (e.g, transit, motorcycle, heavy vehicle, etc.) or they may consider a more general cross section of road users.

Some current or past work that may be of value in consideration of this effort includes:

- [1] Segl, Joaquin. *Shockwave Traffic Theory*. International Municipal Signal Association, 2008.
- [2] Lu, Xiao-Yun and Skabardonis, Alexander. *Freeway Traffic Shockwave Analysis: Exploring NGSIM Trajectory Data*. Transportation Research Board, 2007.
- [3] Abbas, M M and Bullock, D. *ON-LINE MEASURE OF SHOCKWAVES FOR ITS APPLICATIONS*. American Society of Civil Engineers, 2003.
- [4] Wilkie, J K. *USING VARIABLE SPEED LIMIT SIGNS TO MITIGATE SPEED DIFFERENTIALS UPSTREAM OF REDUCED FLOW LOCATIONS*. Texas Transportation Institute, 1997.
- [5] Treiber, Martin and Kesting, Arne and Thiemann, Christian. *How Much Does Traffic Congestion Increase Fuel Consumption and Emissions? Applying Fuel Consumption Model to NGSIM Trajectory Data*. Transportation Research Board, 2008.
- [6] Thiemann, Christian and Treiber, Martin and Kesting, Arne. *Estimating Acceleration and Lane-Changing Dynamics Based on NGSIM Trajectory Data*. Transportation Research Board, 2008.

[7] Barth, Matthew J and NORBECK, JOSEPH M. *TRANSPORTATION MODELING FOR THE ENVIRONMENT*. Partners for Advanced Transit and Highways (PATH); Partners for Advanced Transit and Highways (PATH); University of California, Riverside; California Department of Transportation, 1994.

More detail as well as additional references may be obtained at <http://trisonline.bts.gov/> .

### **Desired Outcomes**

The effort is envisioned as a two-phase effort. By the conclusion of Phase I, a clear description of the proposed technologies to be combined or deployed will be produced. This document will clearly explain the potential of the innovation to mitigate shockwave formation and propagation and the specific ways in which deployment of the innovation will improve roadway system safety, mobility, fuel efficiency, and/or environmental impacts. The document will conclude with an actionable plan to prototype and/or demonstrate the innovation.

In Phase II, the innovation will be prototyped or demonstrated according to the plan outlined in the Phase I report. This demonstration, where possible, should provide some evidence that the expected benefits of the system can be realized. Although a formal cost-benefit analysis is not required in this effort, a demonstration report prepared at the conclusion of Phase II should document the potential value of the innovation if a broader deployment of the innovation were to occur.

### **09-FH2 Development of a Thermographic Device for Evaluating Integrity of Steel Bridge Coatings Nondestructively**

Nowadays preservation of existing bridge structures and thus extending their service lives are more important than ever as available resources shrink for transportation infrastructure. Number of steel bridges accounts for approximately 38 percent of the entire US bridge population and they are mostly covered with protective coatings. Keeping up with the deteriorating coating systems is a time consuming and expensive item among bridge maintenance activities. Depending on time of repair, total costs can vary significantly. It is known that coating repair work is effective and economic before coating degradation in terms of surface failure and coating disbondment reaches about 5-6 percent of the total surface area. Beyond this, the cost and amount of work associated with the maintenance activities tend to increase dramatically. One of the challenges the bridge owners face is to determine non-destructively the best time to apply appropriate repair strategy before coatings exhibit severe rust and/or extensive peeling off. Currently, there are no reliable in-situ non-destructive evaluation (NDE) technologies that can be easily employed by bridge inspectors at the site. Overall goal of the proposed research is to develop an innovative prototype NDE device for evaluating coating condition “before visible damage to appear” on steel bridge structures so that maintenance engineers can monitor progress of coating degradation and capture a right time to implement coating repair work.

There have been several efforts to use off-the-shelf type thermographic devices in conjunction with external heating sources for estimating disbonded coating areas beneath the visually intact coatings. The results were promising in that in laboratory environments the thermographic technology was able to determine disbonded coating areas that then were bound to fail through surface failures at later stages of coating degradation process.

The proposed research is aimed to develop a prototype thermographic device specifically designed for bridge coating systems. Due to access difficulty and size of most bridge structures, the prototype device should be operated from reasonably far distance, mostly from the ground. The proposed system should be able to operate with the least amount of heat, especially for internal steel members hidden by other structural members such as fascia girders. When the thermographic scanning is completed, output of the NDE device should give thermo gradient information in association with extent of coating delamination and surface defects. These system requirements may be realized by modification of existing commercial systems or building a new system. The proposed work consists of two phases.

During the Phase I, a prototype device should be designed based on review of capabilities and limitations of commercially available systems. Subsequently, a working prototype system should be developed to demonstrate feasibility of the system that would be fully developed in the Phase II. It is estimated to achieve the objectives with \$100,000 for the duration of 12 months.

The Phase II is devoted to development of a commercial system including in-situ testing hardware, analysis software, and test protocol. At the end, this phase should conclude with successful field trials on five bridge structures. This phase of work is estimated to take \$750,000 for 36 months.

### **09-FH3 Vehicle Detection, Counting and Tracking System for Travel Surveys, Traffic Safety Systems, and Traffic Control Systems**

The FHWA Office of Safety has identified red light running as a major source of accidents at intersections. The Motorcycle Travel Symposium held by FHWA and NHTSA has identified motorcycle detection, classification, and characterization as key to enhancing motorcycle safety, motorcycle operations and motorcycle travel estimation. In addition, the FHWA Motorcyclist Advisory Council (MAC-FHWA) ( <http://safety.fhwa.dot.gov/mac/> ) has been chartered to look at motorcycle ITS infrastructure issues. Motorcycle fatalities are currently estimated at 30 times those of auto fatalities per Vehicle Mile Traveled (VMT). Studies by Texas DOT have identified the ability to accurately detect, classify and determine the speed of approaching vehicles as a key to adjusting the timing of signals in real time to significantly reduce red light running using the Texas Transportation Institute's algorithms. They also identified the detection and identification of heavy vehicles such as tractor trailers as key. The objective of this project is to develop an advanced sensor for more accurate vehicle classification, speed measurement and reliable counting of all vehicles and potentially to tie the sensor in with a vendor's traffic signal controller to reduce red light running.

The concept *should build on advanced versions of existing sensor technologies* which would be able *to use existing sensor infrastructure* to more accurately detect vehicles, classify them separately and accurately from other vehicles, and improve accuracy of speed measurements over state of the practice systems.

The objective of improving vehicle safety at signalized intersections has two aspects. First, vehicles and particularly motorcycles, bicycles and tractor trailers must be accurately sensed when approaching ITS control systems traveling by themselves with no other vehicles on the link. This is to assure that they obtain green lights and/or ITS messages important to safety. Second, vehicles must be accurately sensed, counted, and characterized when traveling in groups so that accurate measurements of travel may be made for: both (A) VMT measurement purposes; and, (B) congestion mitigation and traffic adaptive control purposes. Third, vehicles must be accurately classified and their speeds measured so that red light running reduction algorithm's such as Bonneson's DC-CS work efficiently to improve safety (see references). Fourth, a preliminary assessment of the needs for accuracy including counting, classification, identification and reidentification, speed and what constitutes accuracy and reliability for the sensor for supporting each of the applications of traffic surveys, safety and operations shall be developed in phase 1. A complete assessment and report on this must be done in Phase 2.

Field tests must demonstrate detection of tractor trailers, motorcycles/bicycles in a variety of weather/lighting/ "time of day" conditions. Conditions need to include sunrise, sunset, noon, night, sun glare in the Spring and Fall and fog, drizzle, rain and snow. Accuracy must be characterized as the mean values and distributions of hits when a motorcycle is present, misses when a motorcycle is present, correct rejections when not present, false alarms when not present, early measurement of presence before the motorcycle arrives over the sensor area, and late measurement of presence after the motorcycle arrives over the measurement area. Mean values and distributions must be characterized over the different epics (measurement periods) of interest of one minute, five minutes, fifteen minutes, one hour and twenty-four hours.

Phase I would demonstrate the test and evaluate the potential of a new technology or enhancement of an existing technology. A demonstration of the basic effectiveness of the concept would be conducted at the TFHRC intelligent intersection. Compatibility with one of 1) 2070 ATC, 2) ATC or 3) NEMA standard traffic signal controller would be part of this test. (note: The TFHRC intersection uses 2070 ATC units so use of another class such as regular ATC's or NEMA controllers might require demonstration at an alternative site such as Purdue's and would need to be coordinated with the alternate site and the project manager)

Phase II would develop the enhancement, demonstrate the prototype at the TFHRC intelligent intersection, continue development and then field test it under a variety of weather conditions. It should also be tested at a research intersection with a large number of sensors and technologies such as the Purdue intelligent intersection or the TTI facilities so that the system can be better characterized against the state-of-the-art.

#### NOTES:

More than one award may be made if different approaches with high promise are submitted.

To provide focus each proposal should focus on either (A) sensor to sensor unique vehicle identification and reidentification – suitable for travel time measurement and link to link origin-destination for turning movement and O-D studies or (B) very accurate vehicle classification and speed measurement suitable for implementation of a DC-CS system. The proposal should discuss why that focus was chosen and how it will be successfully accomplished.

#### **Relationship to FHWA Strategic Objectives:**

•System Performance – Objective 2 – Performance Improvements - Make significant improvements to critical aspects of highway system performance (**safety**, congestion, reliability, infrastructure condition, air quality, user satisfaction, and emergency response). Goal: Safety– Measure: 2.1 Implement comprehensive, integrated, and data-driven safety programs and countermeasures at the Federal, State, and local level.

Comment: This goal requires technology to allow accurate measurement of VMT in ways the state of the practice CANNOT currently do. Similarly, a key element of intersection safety is assuring that all vehicles particularly tractor trailers, motorcycles and bicycles approaching intersections are detected and given an appropriate green and not given an inappropriate yellow. This prevents dangerous red light running.. There are problems doing this reliably using current technology.

System Performance- Objective 1 – Performance Indicators –

1.2: Develop a robust system for collecting, analyzing, and integrating the data necessary to calculate, forecast, and display the selected performance indicators and identify critical performance gaps.

Comment: Again, this outcome cannot be reached unless vehicles can be reliably and ACCURATELY detected, classified and characterized by traffic monitoring systems in all weather and luminance conditions. This is particularly true for tractor trailers, motorcycles, and bicycles. Existing technologies do not adequately provide these capabilities.

System Performance – Objective 2 – Performance Improvements - Make significant improvements to critical aspects of highway system performance (safety, congestion, reliability, infrastructure condition, air quality, user satisfaction, and emergency response).

Desired Outcome: Reduce transportation time from use of improved classification data and/or origin to destination and turning improvement data to improve signal timing. Increase the reliability of trip times for the Individual Transportation User.

Comment: This outcome cannot be reached unless vehicles can be reliably detected and classified so that ITS technologies can appropriately respond.

Relationship to fuel consumption and emissions – Improved highway system performance in safety, congestion, and reliability, directly caused reductions in fuel consumption, CO2 emissions and air

quality for the same VMT

## References

- 1) Identifying Intersections with Potential for Red Light-Related Safety Improvement  
JA Bonneson, K Zimmerman - Transportation Research Record, 2006 - Trans Res Board  
[www.iht.org/technicalaffairs/TRB/files/06-1667.pdf](http://www.iht.org/technicalaffairs/TRB/files/06-1667.pdf)
- 2) Report 0-4196-P1, Red-Light-Running Handbook: An Engineer's Guide to Reducing Red-Light-Related Crashes, James Bonneson and Karl Zimmerman, September 2004  
<http://tti.tamu.edu/documents/0-4196-P1.pdf>
- 3) K.H. Zimmerman, J.A. Bonneson. In-Service Evaluation of a Detection-Control System for High-Speed Signalized Intersections. Implementation Report. 5-4022-01-1. Texas Transportation Institute, College Station, TX. August 2005.  
<http://tti.tamu.edu/documents/5-4022-01-1.pdf>
- 4) J.A. Bonneson, D.R. Middleton, K.H. Zimmerman, H.A. Charara, M.M. Abbas. New Detection System for Rural Signalized Intersections. PSR. 0-4022-S. Texas Transportation Institute, College Station, TX. March 2004.
- 5) "Evidence of Unacceptable Video Detector Performance for Dilemma Zone Protection" Dan Middleton, Ph.D., P.E., Eun Sug Park, Ph.D., Hassan Charara, November 12, 2007, TRB 2008 Annual Meeting

## **09-FH4 Pedestrian Detection, Counting and Tracking Systems for Travel Surveys, Traffic Safety Systems, and Traffic Control Systems**

Current pedestrian and bicycle detectors do not do an adequate job of detecting, counting and tracking pedestrians for automated counting to support traffic surveys. A pedestrian /bicycle detection system using artificial intelligence algorithms for pulling out and tracking pedestrians might significantly increase the accuracy of automated pedestrian counting systems and eventually lead to more pedestrian responsive traffic control systems.

Phase I would develop and demonstrate prototype software and hardware that would embody a simplified version of the system. The software would run on top of RTAI Linux or another open source Linux real time operating system to demonstrate the capabilities. The offeror should explain and justify their approach in their proposal and why it would be an improvement over existing approaches.

Phase I would determine what the "real time" needs are for the algorithms to collect information for traffic survey applications and if installed at an intersection to pass the information on to the local traffic signal controller. (Note: actual interfacing to a traffic signal control system is not required as part of this project) The algorithms and software should be prototyped and validated using MathCad. The software would be demonstrated at the TFHRC IVI intersection at the end of phase I and a mini-symposium would be held for the FHWA panel and other interested researchers..

Phase II would enhance the system algorithms and sensor as a real time traffic survey collection device (interfacing it as part of a traffic signal control system for real time control applications is not required in this project although it may be discussed in the proposal) . Phase II would address issues related to making the system at least minimally functional during rain and snow events. This project requires significant experience in travel data collection, traffic engineering, real time control, Linux, digital imaging and pedestrian and bicycle detection. Phase II should be staged to produce interim

demonstrable results. Phase II should provide final documented copies of the MathCad algorithms. Phase II should include a demonstration of the system at a number of intersections and pedestrian data collection areas to be selected in co-operation with the FHWA advisory panel. A symposium shall be conducted at the FHWA Turner Fairbank Highway Research Center at the end of Phase II to review the results.

This project is needed to allow maximum benefit from travel surveys collected for the FHWA Office of Planning and for safety and traffic operations using the advanced traffic controller (ATC). Existence of pedestrian counting and tracking will enhance intersection collision avoidance (IVI-ICA) algorithms developed by FHWA for ITS over simple pedestrian presence alerting. Algorithms and MathCad software developed under this project should be open source at the end of Phase II to facilitate future research and development of pedestrian counting and tracking.

### **Relationship to FHWA Strategic Objectives:**

- System Performance – Objective 2 – Performance Improvements - Make significant improvements to critical aspects of highway system performance (safety, congestion, reliability, infrastructure condition, air quality, user satisfaction, and emergency response). Goal: Safety– Measure: 2.1 Implement comprehensive, integrated, and data-driven safety programs and countermeasures at the Federal, State, and local level.

Comment: This goal requires technology to allow accurate measurement of pedestrian travel in ways the state of the practice CANNOT currently do. Similarly, a key element of intersection safety is assuring that all pedestrians approaching intersections are detected and given appropriate walk times. This prevents dangerously fast timing for elderly, physically handicapped or blind pedestrians. There are problems doing this reliably using current technology.

- System Performance- Objective 1 – Performance Indicators – 1.2: Develop a robust system for collecting, analyzing, and integrating the data necessary to calculate, forecast, and display the selected performance indicators and identify critical performance gaps.

Comment: Again, for pedestrians, this outcome cannot be reached unless they can be reliably and ACCURATELY detected and characterized by monitoring systems in all weather and luminance conditions. This is particularly true for elderly, physically handicapped and blind pedestrians. Existing technologies do not adequately provide these capabilities.

- System Performance – Objective 2 – Performance Improvements  
Make significant improvements to critical aspects of highway system performance (safety, congestion, reliability, infrastructure condition, air quality, user satisfaction, and emergency response).  
Desired Outcome: Improve the performance of the transportation system by increased knowledge of pedestrian travel. Use of pedestrian travel time and count data to improve signal timing both to provide shorter pedestrian walk times for fast pedestrians and longer walk times for slower moving elderly, physically handicapped and blind pedestrians. Increase the reliability of trip times for the Individual Transportation User.  
Comment: For pedestrians, this outcome cannot be reached unless they can be reliably detected, counted and tracked so that ITS technologies can appropriately respond.

## References:

Sites for pedestrian detection technology

[1] Evaluation of Automated Pedestrian Detection at Signalized Intersections  
REPORT NO. FHWA-RD-00-097

<http://www.tfhrc.gov/safety/pedbike/pubs/00-097.pdf>

[2] Pedestrian Detection

[http://www.gavrila.net/Computer\\_Vision/Looking\\_at\\_People/Pedestrian\\_Detection/pedestrian\\_detection.html](http://www.gavrila.net/Computer_Vision/Looking_at_People/Pedestrian_Detection/pedestrian_detection.html)

[3] L. Zhao and C. Thorpe, "Stereo and Neural Network-based Pedestrian Detection," IEEE Transactions on Intelligent Transportation Systems, Vol. 1, No. 3, September, 2000, pp. 148 -154.

[http://www.ri.cmu.edu/pubs/pub\\_3865.html](http://www.ri.cmu.edu/pubs/pub_3865.html)

[4] Passive Pedestrian Detection: A Case Study

Prepared for the 1998 District 6 Annual Meeting, San Jose

Dana Beckwith, Assistant Transportation Engineer, DKS Associates

Peter L. Coffey, P.E, Principal, DKS Associates

<http://www.dksassociates.com/PassPed.html>

## **09-FH5 Self-Sustaining, Intelligent Pavement Systems**

The pavement infrastructure in the US covers a large surface area and requires intensive energy and natural resources to produce the materials and lay them down. In addition, the surface of the pavement is typically impermeable, causing excess rainwater to run off rather than soak into the ground, which has negative consequences in terms of flooding and natural filtration of toxic substances that accumulate on the pavement surface. Ironically, the vehicles that travel over these pavements are also resource intensive, especially in terms of the fuel that they consume.

Therefore, to reduce the environmental impact of these pavements while maintaining mobility, a new type of pavement is needed that has the following attributes

1. It generates its own power; either through the energy of the sun or perhaps the energy of the moving vehicle mass traveling over the pavement.
2. It is intelligent enough to transfer the power generated to where it is most needed or to a temporary storage apparatus.
3. It is made of recycled or other sustainable materials
4. It can be modular for ease of replacing worn or damaged sections
5. It is durable enough to withstand repeated loading from heavy traffic at or above the level of current pavement systems.
6. It meets or exceeds safety characteristics of existing pavement systems.
7. It mitigates water runoff through either permeability or designed retention and filtration.
8. It is at a cost that allows it to be financially self-sustaining; meaning that the benefits of power generation and water runoff mitigation over the design life outweigh its initial cost.

The product described will satisfy FHWA strategic goals of System Performance and Environmental Stewardship. In addition, it is anticipated that this project may be of interest to the Department of Energy and Environmental Protection Agency for Phase II funding.

Outcomes expected from the Phase 1 include a detailed concept that demonstrates the viability of creating a prototype that satisfies the attributes described above. Phase 2 efforts include manufacturing and demonstrating a working prototype pavement system that demonstrates potential for achieving at least ½ of the identified attributes. This would include measurements for load response, retro reflectivity, friction and electricity generation, transmission and storage.



# **Federal Motor Carrier Safety Administration (FMCSA)**

## **091-FM1 Individualized Fatigue Risk Management in Trucking Operations**

### **Description of Problem to Address:**

Fatigue is recognized as an important problem in trucking operations. Fatigue Management Programs (FMP) are now being considered across the industry to mitigate the performance and safety consequences of fatigue. Modern FMP approaches are based on fatigue and performance models (e.g., Belenky et al., 1998). However, currently available modeling tools have limited applicability in trucking because they do not account for the *considerable* individual differences in responses to shift work and sleep loss (Van Dongen et al., 2005). Due to the trait-like nature of these individual differences (Van Dongen et al., 2004), however, it is possible to overcome this limitation.

### **Literature Review Summary:**

Van Dongen et al (2007) recently developed the first technique to tailor fatigue and performance models to individuals. One way this tool can be used effectively in trucking operations is by first acquiring sleep/wake and performance data from the individual truck driver at hand. These data are then used to individualize the fatigue and performance model. The individualized model is subsequently used as part of the FMP, which typically involves prediction of fatigue in future work schedules. Through the use of the individualized model, therefore, the whole FMP can thus be individualized, constituting a significant improvement in FMP effectiveness.

An individualized FMP could be developed mining data already available in the FMCSA-sponsored truck driver study described in Hanowski et al. (2004). In this naturalistic study, 98 truck drivers drove trucks instrumented with a drowsy driving warning system (DDWS) for an average per driver of 3 months as part of a field operational test (FOT) of the DDWS. Trips lasted from 1 to 11 hours. The drivers were operating under the 2003 hours of service (HOS) rules (14 hours on duty / 10 hours off duty in 24 hours, with a maximum of 60 cumulative hours on duty over 7 days or 70 cumulative hours over 8 days and a 34 hour restart). Actigraphy data collected in this study will be used to estimate sleep and wake times. Slow eyelid closure (PERCLOS) data collected real-time during driving will be used as a measure of fatigue. Individual drivers' data from the first week of the study will be combined and utilized to individualize a fatigue and performance model as technically described in Van Dongen et al. (2007).

This naturalistic driving data could be split into two datasets. The first dataset would be used to develop a tailored FMP model to predict the individual drivers' performance, while the second dataset would be used to validate the tailored FMP model against actual driving performance. A comparison of model results to actual PERCLOS and critical incident data collected during the period will serve as an important validation step for the individualization procedure. To quantify the success of this proof-of-concept project, the contractor will compare our results to those that would be achieved using the conventional, non-individualized version of the fatigue and performance model.

### **Research Objective(s):**

The objective of this project is to develop an individualized FMP model that takes into account individual differences and driving performance. This model will be developed into a tool that could be commercialized for use by the motor carrier industry for scheduling CMV drivers.

## Urgency, Payoff Potential, and Implementation:

Current fatigue models are deficient because they don't take into account the tremendous individual differences that exist between individual subjects or drivers. This modeling effort and tool development could greatly improve schedule development and has the potential to reduce driver fatigue and thereby reducing driver crash risk.

## Research References

- Belenky G, Balkin TJ, Redmond DP, Sing HC, Thomas ML, Thorne DR, Wesensten NJ (1998). Sustaining performance during continuous operations: The U.S. Army's sleep management system. In Hartley L (Ed.), *Managing Fatigue in Transportation*. Pergamon, Oxford: 77-85.
- Hanowski RJ, Nakata A, Olson RL (2004). Methodological overview of the drowsy driver warning system field operational test. In *Safety Performance and Accident Free Driving*, SP-1911 (SAE Technical Paper Series 2004-01-2718). Society of Automotive Engineers International, Warrendale: 103-108.
- Van Dongen HPA, Baynard MD, Maislin G, Dinges DF (2004). Systematic interindividual differences in neurobehavioral impairment from sleep loss: Evidence of trait-like differential vulnerability. *Sleep* 27(3): 423-433.
- Van Dongen HPA, Mott CG, Huang J-K, Mollicone DJ, McKenzie FD, Dinges DF (2007). Optimization of biomathematical model predictions for cognitive performance impairment in individuals: Accounting for unknown traits and uncertain states in homeostatic and circadian processes. *Sleep* 30(9): 1129-1143.
- Van Dongen HPA, Vitellaro KM, Dinges DF (2005). Individual differences in adult human sleep and wakefulness: Leitmotif for a research agenda. *Sleep* 28(4): 479-496.

## Pipeline and Hazardous Materials Safety Administration (PHMSA)

### **Innovative Safety, Reliability and Inspection Technologies**

PHMSA has designed a SBIR topic for 2009 to address issues identified in the focus areas of Pipeline Safety and or Hazardous Materials. The focus areas described below support the DOT Secretary's strategic vision of using SBIR funds to develop "safer, simpler and smarter transportation solutions".

#### **091-PH1 Pipeline Safety:**

America receives over two-thirds of the crude and petroleum products for more than 55 million residential and commercial customers, through more than 168,000 miles of Hazardous Liquid pipelines (based on year 2007 liquid pipeline operator national mileage information). In addition, over 319,000 miles of gas transmission pipeline transport natural gas to local companies that distribute it through over 2,015,000 miles of distribution pipelines to local customers. This supply of energy has too often been disrupted by pipeline leaks. In addition, damage from excavation is the leading cause for in-field utilities disruption.

For Pipeline Safety, research is sought on the use of innovative tools that enable operators to perform in-field detailed assessment on dents and wrinkle bends to determine damage severity as it relates to the pipeline integrity.

#### **1. Development of in-field pipeline inspection tools**

Currently, deformations in pipelines such as dents and wrinkles are measured in the ditch using standard pit gauges. This only allows for the measurement of a maximum deflection and the deformation extent is then measured using a ruler or a straight edge. Such measurement does not provide enough details to perform detailed assessment of the damage severity as it cannot provide the pipeline operator with an accurate representation of the shape of the dent. Recent developments in assessment techniques and understanding of dent behaviors have shown conclusively that the severity of a dent is closely tied to its shape.

Currently, the relatively high cost of specialized tools needed to perform such measurements and the need for highly trained operators has been a deterrent towards widespread use of existing technology in the field.

Applications are sought to study, develop and demonstrate new deformation measurement tools repair techniques for transmission and or distribution pipelines. Anticipated results will include a low-cost, time efficient, simple to use, and reliable tool with validated and established performance.

### **091-PH2 Hazardous Materials:**

Hazardous materials are essential to the economy of the United States and the well-being of its people. Hazardous materials fuel automobiles, heat and cool homes and offices, purify water supplies, used for farming and medical applications, and in manufacturing, mining, and other industrial processes. More than 3 billion tons of regulated hazardous materials – including explosive, poisonous, corrosive, flammable, and radioactive materials – are transported in this country each year. There are over 800,000 daily shipments of hazardous materials moving by plane, train, truck, or vessel in quantities ranging from ounces to thousands of gallons.

#### **1. In-service Testing of Composite Cylinders**

Metallic lined composite cylinders have been used for many years under PHMSA's Special Permit Program. PHMSA has recently approved special permits for a composite cylinder with a non-load sharing liner. The failure modes of composite cylinders with non-load sharing liners are not well understood. DOT limits the life of composite cylinders to 15 years from the date of manufacture based upon work done by NASA and a desire to keep the possible failure rate below 1 in a million. There is a lack of information which can be used to predict the life expectancy of a composite cylinder in service. Research is needed into different methods for conducting in-service testing of composite cylinders.

#### **2. Nanotechnology Application in Hazmat Transportation**

Nanotechnology is increasingly entering the marketplace. Nanotechnology may potentially be used in hazardous material packaging designs to enhance hazmat transportation safety. Research is needed to determine potential ways nanotechnology could be used to improve current packaging used to transport hazardous materials. Nano-sized particles present certain challenges when transported in commerce. Research is also necessary to ensure the safe transportation of nano-sized particles (e.g., appropriate packaging types as well as closure methods for packaging's containing these materials).

### **VIII. SUBMISSION FORMS AND CERTIFICATIONS**

- |                              |            |
|------------------------------|------------|
| 1. PROPOSAL COVER SHEET      | Appendix A |
| 2. PROJECT SUMMARY           | Appendix B |
| 3. CONTRACT PRICING PROPOSAL | Appendix C |

4. **PROPOSAL CHECKLIST**  
(do not include with your proposal – for your use only)

Appendix D

**U.S. DEPARTMENT OF TRANSPORTATION  
SMALL BUSINESS INNOVATION RESEARCH PROGRAM  
SOLICITATION NO. DTRT57-09-R-SBIR1  
FY09.1**

**PROPOSAL COVER SHEET**

Project Title \_\_\_\_\_

Research Topic No. \_\_\_\_\_ Research Topic Title \_\_\_\_\_

Submitted by: Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip + \_\_\_\_\_

Amount Requested (Phase I) \$ \_\_\_\_\_  
(May be up to \$100,000 unless otherwise indicated)

Proposed Duration \_\_\_\_\_  
(in months) (Not to exceed six months)

1. The above concern certifies it is a small business firm and meets the definition stated in Section II.B; and that it meets the eligibility requirement in Section I.C. Yes \_\_\_\_\_ No \_\_\_\_\_
2. The above concern certifies it \_\_\_\_\_ does \_\_\_\_\_ does not qualify as a socially or economically disadvantaged small business as defined in Section II.C. (For statistical purposes only.)
3. The above concern certifies it \_\_\_\_\_ does \_\_\_\_\_ does not qualify as a women-owned small business as defined in Section II.D. (For statistical purposes only.)
4. This firm and/or Principal Investigator has submitted proposals containing a significant amount of essentially equivalent work under other federal program solicitations, or has received other federal awards containing a significant amount of essentially equivalent work. (If yes, identify proposals in the Section III. D.10. "Similar Proposals or Awards".) Yes \_\_\_\_\_ No \_\_\_\_\_
5. Will you permit the Government to disclose the title and technical abstract of your proposed project, plus the name, address, and telephone number of the Corporate/Business Official and Principal Investigator of your firm, if your proposal does not result in an award, to any party that may be interested in contacting you for further information? Yes \_\_\_\_\_ No \_\_\_\_\_
6. Do you qualify as a HUBZone-owned and meet the definition as stated in this Section II. F (For statistical purposes only) Yes \_\_\_\_\_ No \_\_\_\_\_

Principal Investigator  
Name \_\_\_\_\_  
Title \_\_\_\_\_  
Signature \_\_\_\_\_ Date \_\_\_\_\_  
Telephone No. \_\_\_\_\_

Corporate/Business Official  
Name \_\_\_\_\_  
Title \_\_\_\_\_  
Signature \_\_\_\_\_ Date \_\_\_\_\_  
Telephone No. \_\_\_\_\_

**PROPRIETARY NOTICE (IF APPLICABLE, SEE SECTION V.D.1)**

**U.S. DEPARTMENT OF TRANSPORTATION  
SMALL BUSINESS INNOVATION RESEARCH PROGRAM  
SOLICITATION NO. DTRT57-09-R-SBIR1  
FY09.1  
PROJECT SUMMARY**

Name and Address of Offeror	FOR DOT USE ONLY
	Proposal No.

Name and Title of Principal Investigator

Project Title

Research Topic No.	Research Topic Title
--------------------	----------------------

Technical Abstract (Limited to two hundred words in this space only with no classified or proprietary information/data).

Anticipated Results/Potential Commercial Applications of Results.

Provide key words (eight maximum) description of the project useful in identifying the technology, research thrust, and/or potential commercial application.

**U.S. DEPARTMENT OF TRANSPORTATION  
SMALL BUSINESS INNOVATION RESEARCH PROGRAM  
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**APPENDIX C  
(SCHEDULE 1)**

**CONTRACT PRICING PROPOSAL**

<b>PROPOSAL COVER SHEET</b>				1. SOLICITATION/CONTRACT/MODIFICATION NUMBER			
2a. NAME OF OFFEROR				3a. NAME OF OFFEROR'S POINT OF CONTACT			
2b. FIRST LINE ADDRESS				3b. TITLE OF OFFEROR'S POINT OF CONTACT			
2c. STREET ADDRESS				3c. TELEPHONE		3c. FACSIMILE	
2d. CITY	2e. STATE	2f. ZIP CODE		AREA CODE	NUMBER	AREA CODE	NUMBER
4. TYPE OF CONTRACT OR SUBCONTRACT <i>(Check)</i> <input checked="" type="checkbox"/> FFP <input type="checkbox"/> CPFF <input type="checkbox"/> CPIF <input type="checkbox"/> CPAF <input type="checkbox"/> FPI <input type="checkbox"/> OTHER <i>(Specify)</i>				5. <input type="checkbox"/> PRIME OFFEROR <input type="checkbox"/> SUBCONTRACTOR _____ <div style="text-align: right;">PRIME OFFEROR'S NAME</div>			
6. ESTIMATED COST, FEE, AND PROFIT INFORMATION							
A. ESTIMATED COST							
B. PROFIT							
C. TOTAL PRICE							
7. PROVIDE THE FOLLOWING							
NAME OF COGNIZANT CONTRACT ADMINISTRATIVE AGENCY				NAME OF COGNIZANT GOVERNMENT AUDIT AGENCY			
STREET ADDRESS				STREET ADDRESS			
CITY	STATE	ZIP CODE		CITY	STATE	ZIP CODE	
TELEPHONE	AREA CODE	NUMBER		TELEPHONE	AREA CODE	NUMBER	
FACSIMILE	AREA CODE	NUMBER		FACSIMILE	AREA CODE	NUMBER	
NAME OF CONTACT				NAME OF CONTACT			
PROPERTY SYSTEM <input type="checkbox"/> Reviewed by cognizant contract administrative agency and determined acceptable <input type="checkbox"/> Reviewed by cognizant contract administrative agency and determined not acceptable <input type="checkbox"/> Never reviewed				APPROXIMATE DATE OF LAST AUDIT			
				PURPOSE OF AUDIT  (e.g. proposal review, establishment of billing rates, finalize indirect rates, etc.)			
PURCHASING SYSTEM <input type="checkbox"/> Reviewed by cognizant contract administrative agency and determined acceptable <input type="checkbox"/> Reviewed by cognizant contract administrative agency and determined not acceptable <input type="checkbox"/> Never reviewed				ACCOUNTING SYSTEM <input type="checkbox"/> Audited and determined acceptable <input type="checkbox"/> Audited and determined not acceptable <input type="checkbox"/> Never audited			
				OFFEROR'S FISCAL YEAR			
8a. NAME OF OFFEROR <i>(Typed)</i>				9. NAME OF FIRM			
8b. TITLE OF OFFEROR <i>(Typed)</i>							
10. SIGNATURE					11. DATE OF SUBMISSION		

**U.S. DEPARTMENT OF TRANSPORTATION  
SMALL BUSINESS INNOVATION RESEARCH PROGRAM  
CONTRACT PRICING PROPOSAL  
FY09 . 1**

**Background**

The following items, as appropriate, should be included in proposals responsive to this Solicitation.

**Cost Breakdown Items** (in this order, as appropriate) (See Section III.E)

1	Name of offeror		
2.	Address of offeror		
3.	Location where work will be performed		
4.	Offeror's Project Title		
5.	Research topic number and title from DOT SBIR Program Solicitation		
6.	<b>Total Proposal Amount</b>		\$ <input type="text"/>
7.	<b>Direct Material Costs</b>		
	a. Purchased Parts		\$ <input type="text"/>
	b. Subcontracted Items		\$ <input type="text"/>
	c. Other		\$ <input type="text"/>
	(1) Raw Materials		\$ <input type="text"/>
	(2) Standard Commercial Items		\$ <input type="text"/>
	<b>Total Direct Materials (TDM)</b>		\$ <input type="text"/>
8.	<b>Material Overhead (TDM x Rate %)</b>		
		Rate	Amount
	<b>Total Material Overhead (TMO)</b>	<input type="text"/> %	\$ <input type="text"/>
9.	<b>Total Materials (TDM + TMO)</b>		
			\$ <input type="text"/>
10	<b>Direct Labor</b>		
	Type / Personnel	Hours	Rate (\$ / Hr)
			\$ <input type="text"/>
			\$ <input type="text"/>
			\$ <input type="text"/>
	<b>Total Direct Labor (TDL)</b>		\$ <input type="text"/>
11.	<b>Labor Overhead (TDL x Overhead Rate)</b>		
		Rate	Amount
	<b>Total Labor Overhead (TLO)</b>	<input type="text"/> %	\$ <input type="text"/>
12.	<b>Labor: Fringe Benefits (TDL x Benefit Rate)</b>		
		Rate (% or \$ / Hr)	Amount
	<b>Fringe Benefits</b>	<input type="text"/>	\$ <input type="text"/>
13.	<b>Total Labor (TDL + TLO + Fringe)</b>		Amount
			\$ <input type="text"/>
14	<b>Direct Costs: Special Testing (Include field work at Government installations)</b>		
	Item & Anticipated Use	Unit Cost	Estimated Cost
			\$ <input type="text"/>
			\$ <input type="text"/>
			\$ <input type="text"/>



					\$	
	<b>Estimated Total Special Testing</b>				\$	
15.	<b>Direct Costs: Special Equipment</b>					
	Item & Anticipated Use		Unit Cost		Amount	
					\$	
					\$	
					\$	
	<b>Estimated Total Special Equipment</b>				\$	
16	<b>Direct Costs: Travel</b>					
	Travel Location	Mode of Travel	# of Trips	Per Diem	Amount	
					\$	
					\$	
	<b>Travel</b>				\$	
17	<b>Direct Costs: Consultant Services</b>					
	Description of Service				Amount	
					\$	
					\$	
	<b>Total Consultant Services</b>				\$	
18	<b>Direct Costs: Other Direct Costs (ODC) not previously accounted for.</b>					
	Item & Anticipated Use		Unit Cost if applicable		Amount	
					\$	
					\$	
					\$	
	<b>Total Other Direct Costs</b>				\$	
19	<b>Total Direct Costs (TDC) (Sum of Line No. 14 – 18)</b>				Amount	
					\$	
20	<b>General &amp; Administrative Expense ((Total Materials + Total Labor + Total ODC) x Rate)</b>					
			Rate %		Amount	
					\$	
21	<b>Royalties</b>					
	Description				Amount	
					\$	
	<b>Total</b>				\$	
22	<b>Total Cost (Sum of lines 9, 13, 19, 20 &amp; 21)</b>				Amount	
					\$	
23	<b>Profit (Total Cost x Profit Rate)</b>					
			Rate %		Calculated Amount	
					\$	
24	<b>Total Firm Fixed Price Amount (Total Cost + Profit)</b>		\$			
25	THE COST BREAKDOWN PORTION OF A PROPOSAL MUST BE SIGNED BY A RESPONSIBLE OFFICIAL OF THE FIRM. (INCLUDE TYPED NAME AND TITLE AND DATE OF SIGNATURE IN THE SPACE PROVIDED ON THE COVERPAGE OF THIS PROPOSAL)					
26	<b>Provide a yes or no answer to each of the following questions:</b>					(Yes / No)
	Has any executive agency of the United States Government performed any review of your accounts or records in connection with any other Government prime contract or subcontract within the past twelve months? If yes, provide the name and address of the reviewing office, name of the individual and telephone/extension below					

	Will you require the use of any Government property in the performance of this proposal? If yes, identify. <hr/> <hr/>	
	Do you require Government contract financing to perform this proposed contract? If yes, specify type as advanced payments or progress payments. <hr/> <hr/>	
27	Type of contract proposed is, firm-fixed price	
28	DUNS number, if available _____ (See Section III.F)	
29	Tax Identification Number, if available _____	

**U.S. DEPARTMENT OF TRANSPORTATION  
SMALL BUSINESS INNOVATION RESEARCH PROGRAM  
SOLICITATION NO. DTRT57-09-R-SBIR1  
FY09.1  
PROPOSAL CHECKLIST**

This is a CHECKLIST OF REQUIREMENTS for your proposal. Please review the checklist carefully to assure that your proposal meets the DOT SBIR requirements. Failure to meet these requirements may result in your proposal being returned without consideration. (See Sections III of this Solicitation). **Do not include this checklist with your proposal.**

- \_\_\_\_\_ 1. The proposal reflects the fact that for Phase I a minimum of two-thirds (and for Phase II a minimum of one-half) of the research and/or analytical effort will be performed by the proposing firm as required (see Sections V.H.1 and V.H.2) and the primary employment of the principal investigator (for both Phase I and Phase II) must be with the small business firm at the time of award and during the conduct of the proposed research as required (see Section I.C).
- \_\_\_\_\_ 2. The proposal is 25 PAGES OR LESS in length. This limitation does not apply to the additional information required by Section III.H.
- \_\_\_\_\_ 3. The proposal is limited to only ONE of the research topics in Section VIII.
- \_\_\_\_\_ 4. The proposal budget may be up to \$100,000 unless otherwise indicated and duration does not exceed six months.
- \_\_\_\_\_ 5. The technical abstract contains no proprietary information, does not exceed 200 words, and is limited to the space provided on the Project Summary sheet (Appendix B).
- \_\_\_\_\_ 6. The proposal contains no type smaller than ten point font size.
- \_\_\_\_\_ 7. The COVER SHEET (Appendix A) has been completed and is PAGE one of the proposal.
- \_\_\_\_\_ 8. The PROJECT SUMMARY (Appendix B) has been completed and is PAGE two of the proposal.
- \_\_\_\_\_ 9. The TECHNICAL CONTENT of the proposal begins on PAGE three and includes the items identified in SECTION III.D of the Solicitation.
- \_\_\_\_\_ 10. The Contract Pricing Proposal (Appendix C) has been included as the last section of the proposal.
- \_\_\_\_\_ 11. The additional information on prior Phase II awards, if required, in accordance with Section III.H.
- \_\_\_\_\_ 12. The proposal must be a PDF file and submitted online by 5 p.m., April 15, 2009. Proposals may only be submitted online, a link to the web form can be found here: <http://www.volpe.dot.gov/sbir/current.html>. Instructions are included on the submission page.